Montana State University Communications Services

When is Water Good Enough for Livestock?

By Jim Bauder
MSU Extension Soil and Water Quality Specialist

06/11/98 BOZEMAN -- With a variety of water qualities in Montana, many people have questions about whether water is good enough for livestock. In a dry year, as this one has started out to be, water problems are concentrated as water volume is reduced.

In Montana, the most common water problems relate to higher levels of total dissolved solids, alkalinity and nitrates. Generally, water's mineral content is reported as parts per million or milligrams per liter. The basic rule is that livestock should not drink water with total dissolved solids over 10,000 mg/l or a combination of nitrate and nitrite that exceeds 100 mg/l.

The USDA in various technical notes cites the following water content standards:

Content Recommendations for Water Suitable for Livestock	
Aluminum (Al)	5 ppm
Arsenic (As)	0.2 ppm
Iron (B)	5 ppm
Cadmium (Cd)	0.05 ppm
Chromium (Cr)	1 ppm
Cobalt (Co)	1 ppm
Copper (Cu)	0.5 ppm
Fluoride (F)	2 ppm
Lead (Pb)	0.05 ppm
Mercury (Hg)	0.01 ppm
Nitrate+Nitrite	100 ppm
Nitrite	10 ppm
Selenium (Se)	0.05 to 0.10 ppm
Vanadium (V)	0.1 ppm
Zinc (Zn)	24 ppm
Total Dissolved Solids	10,000 ppm
Magnesium + Sodium sulfates	5,000 ppm
Alkalinity (carbonate + bicarbonate)	2,000 ppm

The saltiness of water is commonly measured by *total dissolved solids*, which is approximated with the specific or electrical conductance, as measured in either umhos/cm or deceseimens/meter. The following table describes various degrees of water saltiness and their suitability for watering livestock.

Suitability of Saline Water for Livestock	
less than 1,500 umhos/cm or total dissolved solids of less than 1,000 mg/l	relatively low level of salinity excellent for all classes o
1,500-5,000 umhos/cm or TDS of 1,000 - 3,000 mg/l	satisfactory for all classes of livestock; may cause te diarrhea in livestock not accustomed to the water
5,000-8,000 umhos/cm or TDS of 3,000-5,000 mg/l	satisfactory but may cause temporary diarrhea or be r poor quality for poultry
8,000-11,000 umhos/cm or TDS of 5,000-7,000 mg/l	can be used with reasonable safety for dairy and beef swine, and horses; avoid using with lactating animals
11,000-16,000 umhos/cm or TDS of 7,000-10,000 mg/l	unfit for poultry and swine; considerable risk for lactati should be avoided although older ruminants, horses water of this quality under some circumstances
over 16,000 umhos/cm or TDS over 10,000 mg/l	unacceptable

Conductance is sometimes reported as mmhos/cm, which is umhos/cm divided by 1000. To convert to umhos/cm, multiply mmhos/cm by 1000.

Send questions or comments to Carol Flaherty, MSU Communications Services, Bozeman, MT 59717 or to Bauder and Flaherty with this link: carolf@montana.edu.

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 S[illegible] Billings, MT 59107-0916
800-735-4489 • 406-[illegible] • 406-252-6069 fax • e[illegible]

LABORATORY ANALYSIS REPORT

CR Kendall Lab
Glen Pugg
PO Box 799
Hilger, MT 59451

Project ID: APRIL MONTHLY
Sample ID: CRK-0104-201
Laboratory ID: 01-53100-5
Sample Matrix: Water
Sample Date: 24-Apr-01 1115
Received at lab: 26-Apr-01

KuPB - 5

Reported: 04-May-01

	Results	Units	Qual	Reporting Limit	Regulatory Limit	Method	Analyzed	
Sulfate	1550	mg/l		1		EPA 300.0	01-May-01 2131	LDV
Specific Conductance @ 25 C	2560	umhos/cm		1		SM 2510B	26-Apr-01 1433	KP
pH	7.4	s.u.		0.1		EPA 150.1	26-Apr-01 1433	KP
Nitrogen, Nitrate + Nitrite	6.21	mg/l		0.01		EPA 353.2	30-Apr-01 1751	BS
Arsenic, Dissolved	<0.003	mg/l		0.003		EPA 200.8	03-May-01 2250	CAR
Selenium, Dissolved	0.006	mg/l		0.001		EPA 200.8	03-May-01 2250	CAR
Thallium, Dissolved	0.026	mg/l		0.002		EPA 200.8	03-May-01 2250	CAR

ENERGY LABORATORIES, INC. • P.O. Box 30916 • 1120 South 27th St • Billings, MT 59107-0916
800-735-4489 • 406-252-6325 • 406-252-6069 fax • el@energylab.com

LABORATORY ANALYSIS REPORT

CR Kendall Lab
Glen Pepp
PO Box 799
Hilger, MT 59451

Project ID: APRIL MONTHLY
Sample ID: CRK-0104-219
Laboratory ID: 01-53100-4
Sample Matrix: Water
Sample Date: 24-Apr-01 1130
Received at lab: 26-Apr-01

TMW-26

Reported: 04-May-01

	Results	Units	Qual	Reporting Limit	Regulatory Limit	Method	Analyzed	
Sulfate	311	mg/l		1		EPA 300.0	01-May-01 2120	LDV
Specific Conductance @ 25 C	1350	umhos/cm		1		SM 2510B	26-Apr-01 1432	KP
pH	7.0	s.u.		0.1		EPA 150.1	26-Apr-01 1432	KP
Nitrogen, Nitrate + Nitrite	5.71	mg/l		0.01		EPA 353.2	30-Apr-01 1751	BS
Antimony, Dissolved	<0.003	mg/l		0.003		EPA 200.8	03-May-01 2205	CAR
Arsenic, Dissolved	<0.003	mg/l		0.003		EPA 200.8	03-May-01 2205	CAR
Selenium, Dissolved	0.007	mg/l		0.001		EPA 200.8	03-May-01 2205	CAR
Thallium, Dissolved	0.028	mg/l		0.002		EPA 200.8	03-May-01 2205	CAR